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Continued Item: No

## **Board Agenda Item**

TO: Air Pollution Control District Board

FROM: Aeron Arlin Genet, Air Pollution Control Officer 

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SUBJECT: Santa Barbara County's Emission Inventory

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### **RECOMMENDATION:**

Receive a presentation from District staff on Santa Barbara County's Emission Inventory.

### **BACKGROUND:**

Each year, the District compiles an emission inventory for Santa Barbara County. The preparation of an emission inventory is a requirement under the California Health & Safety Code<sup>1</sup> and is critical for the following reasons:

- Planning for air quality attainment,
- Developing control measures,
- Observing historical emission trends,
- Predicting future air quality trends, and
- Ensuring compliance with rules/regulations or permit conditions.

The emission inventory is a bottom-up approach to estimating emissions countywide. It gathers facility specific emission information from the more than 1,000 facilities currently under permit with the District, and combines that with statewide data provided from the California Air Resources Board for mobile and area sources. The emission inventory does not correlate directly to pollutant concentrations recorded by the District's network of monitoring stations. Some of the District's monitoring stations are designed to measure regional air quality, and some are designed to measure pollution from specific industrial sources.

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<sup>1</sup> California Health & Safety Code Sections 39607 and 39607.3 require CARB to compile and update an emission inventory using its and each local district's best estimates of emissions from all sources.

The emission inventory is compiled through a collaborative effort by the District and the California Air Resources Board (CARB) and is broken down into specified source categories:

- **Stationary sources:** sources that are subject to District permitting requirements and can typically be pinpointed on a map.
- **Area sources:** small, geographically dispersed processes that generally are not subject to District permitting requirements. For example, natural gas combustion in homes is considered an area source.
- **Mobile sources:** on-road and off-road vehicles and equipment, boats, airplanes, and trains.
- **Natural sources:** biogenic sources (e.g., organic compounds emitted by plants), geogenic sources (e.g., natural oil & gas seeps), wildfires, and windblown dust.

The District takes the lead on calculating emissions from stationary sources and some area sources, and CARB calculates emissions from mobile sources, natural sources, and the remaining area sources. Each year, more than 1,000 stationary source facilities permitted by the District submit annual reports indicating their production rates and material throughputs for the prior year. This information is entered into our database, which uses established emission factors to calculate the amount of pollution emitted from each facility. The District reviews the data and submits it to CARB, and works with the state agency to refine the emissions data in preparation for submittal to the U.S. Environmental Protection Agency (EPA).

Historically, the District adheres to CARB's emission inventory reporting guidelines and completes annual reporting of criteria and toxic pollutant emissions from all stationary sources that emit 10 or more tons per year of combined criteria pollutants. For sources that emit less than 10 tons per year combined, triennial reporting is required. Annual reporting is also required for high-risk toxic sources that emit 10 tons per year of any single TAC or 25 tons per year for all TACs combined, that have a health risk of 10 in a million or greater, or that are required to report under the AB 2588 Air Toxics "Hot Spots" Program.

The emission inventory includes the following pollutants:

**Criteria Pollutants** - *pollutants with state and federal ambient air quality standards that were developed using health-based criteria:*

- **Ozone precursors, which includes both reactive organic compounds (ROC), and nitrogen oxides (NO<sub>x</sub>).** Ozone, a primary component of smog, forms through a complex photochemical reaction involving ROC, NO<sub>x</sub>, and the presence of heat and sunlight. Exposure to ozone can cause respiratory health effects such as coughing, shortness of breath and reduced lung function, and can aggravate asthma and other respiratory illnesses.
- **Particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>).** PM<sub>10</sub> is particulate matter less than 10 microns in diameter and PM<sub>2.5</sub> is particulate matter less than 2.5 microns in diameter. Suspended particles less than 10 microns in diameter (about one-fifth of the diameter of a human hair) can bypass the body's protective mechanisms, and be inhaled into the airway and

lungs and can cause respiratory and cardiovascular illnesses. PM<sub>2.5</sub> pollution is a subset of PM<sub>10</sub> and can cause more serious respiratory and cardiovascular health issues.

- **Sulfur dioxide (SO<sub>2</sub>).** SO<sub>2</sub> can be emitted into the atmosphere from the burning of fossil fuels by power plants and industrial facilities as well as transportation fuels. SO<sub>2</sub> can harm the respiratory system and can react with other compounds to contribute to particulate matter pollution.
- **Carbon monoxide (CO).** CO is a tasteless and odorless gas produced by burning any fuel. The presence of CO can cause a variety of symptoms such as headaches and dizziness because it impairs the blood's ability to carry oxygen to the brain and heart. This pollutant is primarily a concern in confined spaces.
- **Lead.** Sources of lead include aviation fuel, ore and metals processing, waste incinerators, and other industrial operations. Once taken into the body, lead accumulates in the bones and can affect the nervous, immune, cardiovascular, reproductive, and other systems.
- **Nitrogen dioxide (NO<sub>2</sub>).** NO<sub>2</sub> is primarily emitted through the burning of fuel in a variety of equipment including engines, turbines, boilers, cars, trucks and buses, and off-road equipment. NO<sub>2</sub> can irritate airways in the human respiratory system. Short-term exposure can aggravate respiratory diseases, particularly asthma. Longer exposure may contribute to the development of asthma and increase susceptibility to respiratory infections.

**Toxic air contaminants (TACs)** – TACs are chemicals released into the air that are known to cause short-term and/or long-term health effects, including cancer and other serious health problems. Examples of TACs include hexavalent chromium, benzene, toluene, and diesel particulate matter. The health impacts from TACs can vary widely by pollutant based on potency, toxicity, quantity, and proximity to receptors. For example, a pound of hexavalent chromium can have devastating long-term health effects as compared to a pound of toluene. However, a pound of toluene can cause more immediate health effects. CARB's list of more than 200 TACs, which includes both federally identified pollutants (hazardous air pollutants, or HAPs), as well as additional state-identified TACs. CARB has developed a method to compare the relative toxicity of pollutants emitted at a facility by developing equations for calculating the toxicity-weighted emissions from a given pollutant.

**Greenhouse Gases (GHGs)** – California has identified seven greenhouse gases that CARB is responsible for monitoring and regulating in order to reduce emissions: Carbon dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Nitrous oxide (N<sub>2</sub>O), sulfur hexafluoride (SF<sub>6</sub>), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and nitrogen trifluoride (NF<sub>3</sub>). CO<sub>2</sub>, Methane and N<sub>2</sub>O are the primary pollutants of concern since they represent the majority of GHG emissions. However, the other four fluorinated gases are referred to as high global warming potential (High-GWP) gases and are also important due to their long lifetimes in the atmosphere, and high global warming potentials. CARB is responsible for establishing a statewide GHG emission limit and compiling California's GHG inventory. While the District is not mandated to estimate a GHG inventory, the District collects the relevant information needed to calculate GHG emissions from permitted sources through its annual reporting process.

## DISCUSSION:

### Emission Inventory Trends

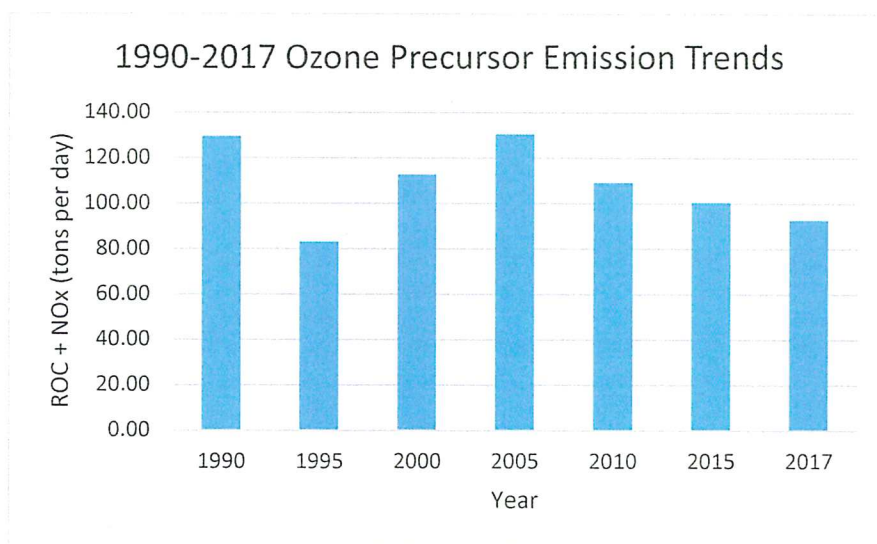
The following series of charts displays historical emission inventory trends for Santa Barbara County, at approximately five-year intervals<sup>2</sup>, starting in 1990. Through a combination of federal, state, and local regulatory and voluntary programs, emissions of all pollutants in Santa Barbara County have generally trended downward over time. Sectors that are beyond the authority of these programs, such as marine shipping in the waters offshore of the county, have at times trended upward. The charts display emissions from the planning emission inventory which includes stationary, area and mobile sources, but excludes natural sources:

- Figure 1 displays ozone precursor (ROC and NOx) emission trends,
- Figure 2 displays PM<sub>10</sub> emission trends,
- Figure 3 displays PM<sub>2.5</sub> emission trends, and
- Figure 4 displays GHG emissions from stationary sources that are subject to CARB's Mandatory Reporting Regulation, for reporting years 2008 to 2016.

### **Ozone Precursors**

Figure 1 shows emission trends for ROC and NOx, combined. Both pollutants are considered precursors to ozone, a pollutant for which the county does not currently meet the state ambient air quality standard. Generally, emissions from ROC and NOx peaked in 2005, and have consistently trended down since. The District's regulatory programs, including prohibitory rules and permit, emission control, and emission offset requirements, have successfully reduced ozone precursor emissions from stationary sources. The District's voluntary programs, including Clean Air Grants, Old Car Buy Back, and marine Vessel Speed Reduction, have also succeeded in reducing emissions from local sources.

**Figure 1 – Ozone Precursor Emission Trends**

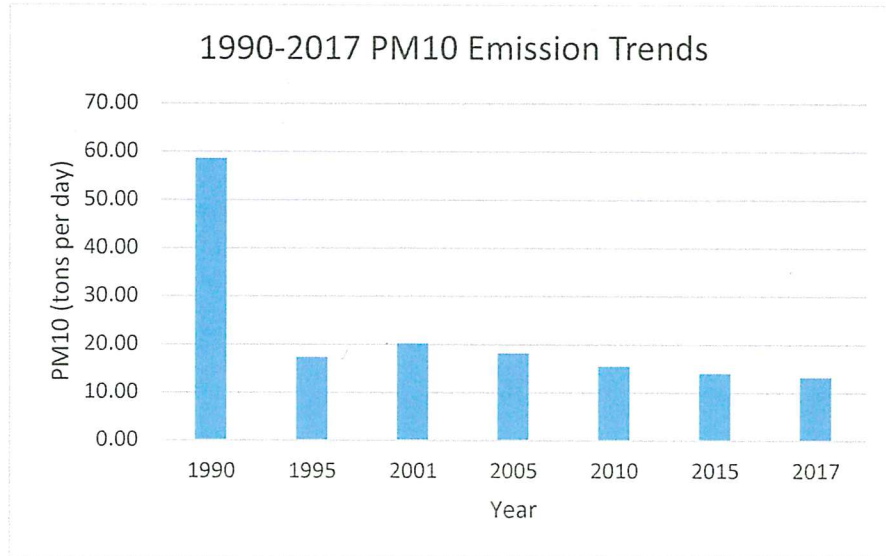


<sup>2</sup> Figure 2 and Figure 3 use 2001 as a data point instead of 2000, due to methodology errors in the 2000 data.

### Particulate Matter less than 10 microns (PM<sub>10</sub>)

Figure 2 shows emission trends for particulate matter less than 10 microns in diameter. PM<sub>10</sub> comes from a variety of sources and emissions can be aggravated by natural influences such as winds and soil moisture. Generally, PM<sub>10</sub> emissions have trended down over time. The District's regulatory and voluntary programs have helped to reduce PM<sub>10</sub> emissions; however, the county does not meet the state ambient air quality standard for PM<sub>10</sub>.

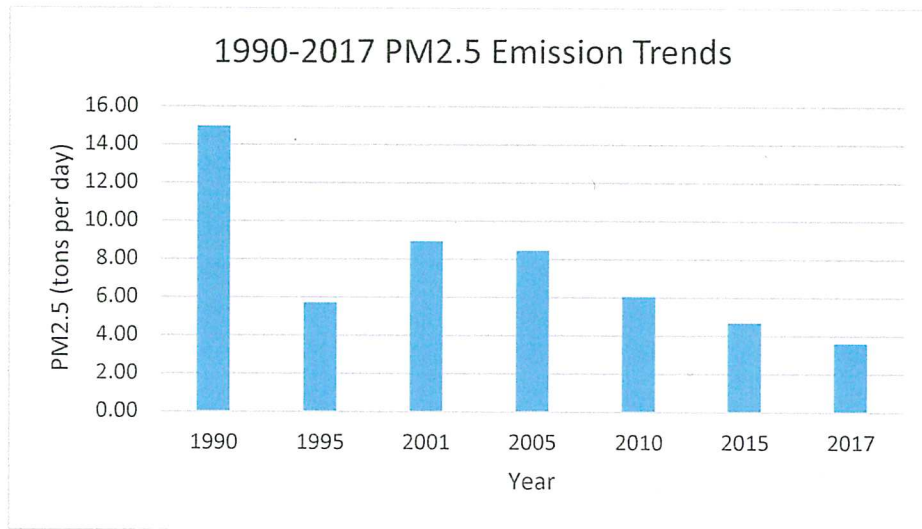
**Figure 2 - PM<sub>10</sub> Emission Trends**



### Particulate Matter less than 2.5 microns (PM<sub>2.5</sub>)

Figure 3 shows emission trends for particulate matter less than 2.5 microns in diameter. PM<sub>2.5</sub> comes from a variety of industrial and mobile sources, and is a by-product of combustion. PM<sub>2.5</sub> from combustion of diesel fuel is considered a Toxic Air Contaminant. PM<sub>2.5</sub> is produced in large amounts during wildfires and other activities that involve wood burning. Wildfires aside, emissions can be higher in the winter, when wood is burned for heating. PM<sub>2.5</sub> emissions have generally been reduced over time through regulatory and voluntary programs. The District's Lower Emission School Bus program reduces diesel PM emissions from the county's school bus fleets, and the Woodsmoke Reduction Program helps to reduce PM<sub>2.5</sub> emissions in local neighborhoods.

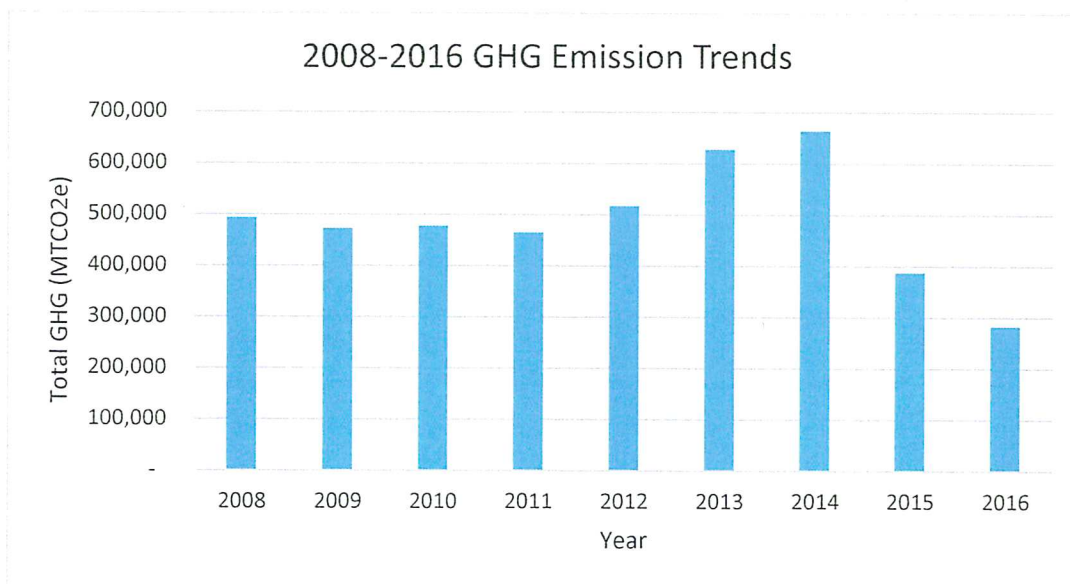
**Figure 3 - PM<sub>2.5</sub> Emission Trends**



### Greenhouse Gases

Fourteen large stationary sources in the county are subject to CARB's Mandatory Reporting Requirement for greenhouse gases. Figure 4 displays combined emissions of CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O, which are normalized based on their global warming potential values and are expressed in metric tons of carbon dioxide equivalent (MTCO<sub>2</sub>e). In 2012, additional sources were added to the inventory, leading to an increase in emissions. The sharp decline in emissions in 2015 and 2016 can be mainly attributed to decreased oil and natural gas production at a few sources due to Line 901 being shut down after the Refugio Oil Spill.

**Figure 4 - GHG Emission Trends**



## Update on Emission Reporting Requirements

In recent years, the state legislature has prioritized emission reporting information to ensure completeness and transparency of the data that is readily available for the public to review. In September 2016, the state passed AB 197, requiring CARB to provide information to the public about greenhouse gas (GHG), criteria, and toxic pollutant emissions as well as to display the emissions in a manner that illustrates trends over time. With this mandate, CARB created the Pollution Mapping Tool<sup>3</sup>. This web-based tool displays GHG, criteria, and toxic pollutant emissions for 2008-2016 for the facilities in California that are subject to the AB 32 Mandatory Reporting Regulation.<sup>4</sup> These facilities are among the largest facilities operating in the state, such as industrial sources, fuel suppliers and electricity importers. CARB plans to add emissions data from all other permitted facilities, area sources, and mobile sources by the end of 2019. The District submits criteria and toxic pollutant emissions data to CARB annually, and is currently working under a grant agreement with CARB to refine the data included on the Pollution Mapping Tool.

AB 617, recently enacted in 2017, requires CARB to develop a uniform statewide system for annual emissions reporting for stationary sources. To meet this requirement, CARB adopted the Regulation for the Reporting of Criteria Air Pollutants and Toxics Air Contaminants (Criteria and Toxics Reporting Regulation) in December 2018.<sup>5</sup> This regulation aims to improve statewide inventory data and increase transparency to help identify communities disproportionately affected by air pollution and most in need of resources to address inequities.

The December 2018 adoption of the Criteria and Toxics Reporting Regulation establishes the applicability and reporting framework to ensure a consistent approach to reporting statewide. CARB intends to make future revisions to the regulation to include uniform statewide methods for calculating and reporting emissions. The District has participated in a CARB working group to address these new reporting requirements, and will continue to work with CARB and the California Air Pollution Control Officers Association (CAPCOA) to ensure that an efficient process is developed to collect and display emission inventory information to the public in an accurate and timely manner.

Initially, the Criteria and Toxics Reporting Regulation will not affect the District's current emission inventory and reporting process, since the District already reports much of the required information to CARB on an annual basis. Over the next several years, CARB will tighten the emission inventory reporting requirements, and will capture more stationary sources throughout California than were historically required to report. Future requirements will mean additional District staff time, and will also require additional data to be collected and submitted by permitted sources. CARB has provided grants to the District during this fiscal year to help fund local implementation of AB 617, including emission inventory and reporting requirements.

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<sup>3</sup> CARB's Pollution Mapping Tool: [www.arb.ca.gov/ei/tools/pollution\\_map](http://www.arb.ca.gov/ei/tools/pollution_map)

<sup>4</sup> More information on the CARB Mandatory Reporting Regulation: [www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep.htm](http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep.htm).

<sup>5</sup> [ww2.arb.ca.gov/rulemaking/2018/proposed-regulation-reporting-criteria-air-pollutants-and-toxic-air-contaminants](http://ww2.arb.ca.gov/rulemaking/2018/proposed-regulation-reporting-criteria-air-pollutants-and-toxic-air-contaminants)